MIRL #4

# THE MARKET FOR INSULATION IN ALASKA AND FEASIBILITY OF THE REGIONAL MANUFACTURE OF INSULATING MATERIALS

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# I

# INTRODUCTION

This investigation was undertaken jointly by the Mineral Industry Research Laboratory and the Institute of Business, Economic and Government Research at the University of Alaska. It is one of a continuing series of studies concerning the market and utilization rate for selected structural materials within Alaska. The overall objective of these studies is to identify opportunities for the regional manufacture of selected building products. In this manner, this limited study of insulation markets complements more extensive previous studies concerning Alaskan cement and clay products, markets and manufacturing feasibility.

To fully evaluate the insulation materials market the commercial-industrial and residential building programs in the state were analyzed. Field interviews were conducted with construction firms, designers and insulation distributors in the Anchorage and Fairbanks areas. Director mail questionnaires were sent to national manufacturers, and a direct interview sample of retailers outside the Anchorage-Fairbanks area was taken.

Since most building products and insulations are manufactured outside of the stage, particular attention was focused upon the manner in which manufacturers distributed products to and in Alaska. Price and cost levels to Alaskan construction businesses were identified because of their implications concerning the possibility of the location of

plants within the state. The lack of precise transportation and sales data concerning the quantities and types of products sold and the confidential nature of this information makes exact quantification of markets difficult.

The study is organized along the following lines. Chapter II reports the summary of research and implications of the study. Insulation manufacturing processes and products are surveyed in Chapter III. The demand for various kinds of insulating materials and marketing practices in Alaska are established in Chapter IV. A review of potentially feasible manufacturing processes, using available raw materials of the region, is presented in Chapter V.

# II

# SUMMARY AND IMPLICATIONS



## Introduction

Certain kinds of insulation products can be profitably produced and sold in Alaska. Polystyrene foam insulation production will continue to expand. A small-scale rock wool plant might be feasible. Utilization of Alaskan raw materials in the production of lightweight aggregate should occur in the very near future. Production of each product is subject to special problems in manufacturing and marketing dictated by the unique economy of the region.

The installation of a large or medium sized mineral insulation manufacturing plant in Alaska clearly is not feasible. The region's market is insufficient to justify an economically efficient plant. Since many of the mineral insulation products are sold in packaged form, insulation produced here would have to be fabricated into multiple specialty finished products. A plant in Alaska would be unable to compete for national markets, and would have difficulty in acquiring the southeastern Alaska market.

Trends in product form and usage. The predominant share of insulation materials are sold as packaged products (e.g. blanket, batt), and little insulation in loose form is sold today. Several other important trends affect manufacturing in this region. Structural components and

pre-built homes, which are now taking a larger share of the Anchorage and Fairbanks market, will result in less insulation being sold by wholesale-retail outlets. The increasing use of lightweight aggregates will lead companies to enter this field, probably using local raw materials.

Regional market segments. The market for insulating materials is sharply divided. A manufacturer necessarily must produce a full line of insulation products in order to produce at capacity. This would include industrial, commercial and general building insulating materials. The southeastern Alaska market operates separately and distinctly from the Anchorage-Fairbanks urban areas. It probably could not be served by a new manufacturer.

Marketing practices. Existing trade channels of the two large national manufacturers are very well established. New competing channels of distribution would be difficult to build. A regional manufacturer, who could produce "efficiently," might still be unable to acquire a significant share of the Alaskan sales. A new manufacturer would have difficulty in bidding for the higher margin industrial insulation market segment. In recent years, a substantial shift in wholesaling and retailing has occurred. The Anchorage market has expanded substantially at the expense of Fairbanks and small urban stores. With

the entry of a permanent Sears Roebuck facility in Anchorage, this shift in sales concentration will continue.

Manufacturing economies of scale. The minimum manufacturing size for mineral insulation is usually considered a plant in the 1,000 tons per month classification. This substantially exceeds the current and projected insulation consumption in Alaska. Therefore, local manufacturing must occur on an output scale which allows for sharp seasonal fluctuations in sales and limited consumption.

Regional insulation manufacturing opportunities. Several regional manufacturing opportunities exist for which detailed cost estimates should be prepared. The manufacture of a lightweight concrete block, possessing inherent insulation characteristics, appears to be currently feasible in the Anchorage area using local raw materials. Existing block manufacturers could produce and market this product as one component of a broader product line.

Cost studies should also be made to evaluate the feasibility of a small rock wool plant. Two alternatives exist; (1) a plant in the Healy area utilizing a shale-limestone raw material blend, (2) a plant on the Kenai Peninsula using slag from a proposed smelter in that area. Since the major manufacturing cost occurs in conversion of the raw material to the molten state, the second alternative is more desirable.

The manufacture of expanded plastic "foam" insulation is currently successfully accomplished in the Fairbanks area. More aggressive marketing and/or regional manufacturing of this product should be strongly considered for the Anchorage area.

## Implications

In the course of the study several important tentative conclusions were drawn concerning the effective operation of Alaska's construction industry. Listed below are the points which the authors believe are currently important.

Rapid distribution channels. Existing factory sales branches now market more than 60 percent of insulation products wholesaled in Alaska. Entry in wholesaling of these kinds of building materials would be extremely risky for a new firm. In addition, existing national manufacturers are not good prospective buyers for locally produced insulation materials.

Dealer entry. Although the sale of insulation materials to independent dealers throughout Alaska might seem simple to implement, drastic changes are now occurring in the retailing of these kinds of products. Several distributors and dealers have withdrawn from selling insulating materials in the last four years. In addition, Sears Roebuck and Montgomery Ward, who typically sell a significant amount of

insulation in other areas, are just beginning to actively enter this field in Alaska. As the new full-service Sears Roebuck and Montgomery Ward stores with regional warehousing open in Anchorage, the retailing of building materials will change accordingly. For example, Sears Roebuck already sells nearly two-thirds of the furnaces purchased by household customers, and will undoubtedly acquire insulation sales from these customers.

Innovations in transportation versus manufacturing opportunities. In the past two years transportation costs to Alaska have fallen markedly. Time delays in delivery have been shortened considerably. Service has been improved in ocean transportation. Sea Land entered the regional transportation field. As tariffs fall and service improves in moving commodities from the Pacific Northwest, regional manufacturing opportunities become poorer. The prices of products produced in the other states are declining in the construction materials field. The opportunities to manufacture insulation are now limited to those products in which local firms have a unique competitive advantage.

Attracting entry of national manufacturers. Existing national manufacturers who now operate factory distributors in Alaska might be able to establish regional plants. The survey of manufacturer interest in Alaskan branch plants, however, revealed no such positive intentions.

Recommendations.

(1) The need for a lightweight aggregate cement plant in Alaska is very real. Builders, designers and contractors have made their interest known, yet manufacturers have not produced the very products which are demanded. Existing cement block manufacturers in Anchorage could and should introduce this project.

(2) The bidding depository, which once operated in Anchorage to facilitate "fair and honest" government subcontracting, should be re-instituted. Present bidding and subcontracting chaos invite inappropriate pricing and contracting practices. The re-creation of the bid depository would encourage bona fide price competition and discourage the present inefficient and discriminatory renegotiation practices.

# MANUFACTURING PROCESSES AND GENERAL PRODUCT TYPES AND FORMS

Two distinct product categories exist in the insulation industry. One category, known as "industrial insulation", denotes insulation used for piping, equipment and other vessels used by industry in the temperature ranges above the boiling point and below the freezing point of water. Excluded are applications in the atmospheric temperature range as well as the extremely high temperature range. A second category of insulation includes those products used in residential or commerical construction necessary to insure human comfort under climatic conditions. Within these categories some overlapping of product forms and material types occurs. Product fabrication techniques and auxiliary materials may vary substantially.

## Product Form

The common insulation materials used in either building or industrial applications are produced in loose, blanket or batt, or rigid form. Loose fill insulation may be granular, powdered or fibrous in nature. It may be pneumatically placed, poured, or hand-packed into the space to be insulated. Pneumatic blowing and pouring are used for hollow walls and over ceiling areas in either new or existing structures, and handpacking for fitting material into irregular spaces.

Batts and blankets refer to flexible insulation forms either sized for standard framing dimensions, or for pipe covering and other irregular uses. The method of manufacture

involves facing or enclosing the insulation by other materials or by bonding together unfaced fibrous material. The facing and enclosing materials typically are paper, foil or wire mesh. One facing usually consists of a vapor barrier to eliminate condensation and freezing of moisture within the insulation.

Rigid board, block and slab insulations are materials so bound or compressed that they provide structural strength in construction as well as insulation value. Common rigid products are used for perimeter, cold storage, cavity and curtain wall insulation and as shingle backer, ceiling board and sheathing and pipe insulation. Miscellaneous forms of insulation include reflective materials manufactured with or without rigid backing, materials foamed in place to achieve irregular shapes and volumes, lightweight insulating cements, and sprayed-on materials and combinations of individual insulating materials.

## Material Types

The many categories of insulating materials which are listed in the technical literature are based on physical form, utilization temperature range or raw material composition. Table 1 shows a combination of several classifications and lists the common insulation materials according to the form and temperature range of utilization. In the following paragraphs, each major product category is described on the basis of raw materials composition.

TABLE I
MAJOR INSULATION PRODUCTS
COMPOSITION, FORM AND TEMPERATURE RANGE

| Insulation Form | Temperature Range: Refrigeration and Low Temperatures (below 32°F) |
|---|---|
| Loose Fill | Granulated Cork<br>Shredded Redwood Bark<br>Pelletized Mineral Wool (glass, slag, and rock)<br>Expanded Silica Spheres<br>Gilsonite Granules<br>Foamed Glass Pellets |
| Blanket or Batts | Mineral Wool (glass, slag, rock)<br>Felted cattle hair |
| Rigid Blocks, Boards or Pipe Covering | Corkboard<br>Mineral Wool (felted and bonded)<br>Cellular glass<br>Expanded Polystyrene<br>Foamed Resins<br>Expanded Rubber<br>Sugar-Cane fiberboard<br>Glass fiber (resin bonded and asphalt coated) |
| Reflective | Aluminum foil<br>Foil surfaced papers<br>Reflective blankets<br>Foil coated cotton<br>Aluminum coated gypsum board |
| Other | Sprayed products (fiber flakes and adhesives) |

| Building and Home Construction | Moderate and High Temperature (above 21°F) |
|---|---|
| Mineral Wool (glass, slag, rock)<br>Reprocessed Wood Fibers or Shredded Paper<br>Vermiculite<br>Perlite<br>Powdered Gypsum | Diatomaceous silica (calcined or ground)<br>Mineral wool (glass, slag, rock)<br>Expanded vermiculite<br>Foamed Glass Pellets |
| Mineral Wool (glass, slag, rock)<br>Wood fiber<br>Cotton | Mineral Wool (glass, slag, rock)<br>Silica fibers<br>Asbestos fiber |
| Organic Foams (hard rubber, polystyrene, urethane)<br>Inorganic foams (glass, cement)<br>Inorganic Fiberboard (glass, mineral wool)<br>Organic Fiberboard (wood or cane fibers)<br>Shredded Wood and Cement<br>Corkboard<br>Fabricated Panels (paper, plastic, metal honeycombs, fibrous or foamed cores)<br>Glass blocks | Corrugated asbestos paper<br>Asbestos fiber and binder<br>Diatomaceious earth, asbestos fiber, organic binder<br>Asbestos felts<br>Mineral Wool with binder<br>Magnesium carbonite and asbestos fiber<br>Calcium silicate and asbestos fiber<br>Diatomaceious earth and binder<br>Foamed glass<br>Vitrified air cell<br>Natural or calcined diatomaceous silica<br>Expanded vermiculite and binders |
| Aluminum foil<br>Foil surfaced papers<br>Reflective blankets<br>Foil coated cotton<br>Aluminum coated gypsum board | Aluminum foil<br>Preformed aluminum |
| Light weight aggregate concretes (expanded shales, clays, slates, slags, perlite, pumice, or vermiculite aggregate) | |

Mineral wool- Mineral wool is an inclusive term used to denote slag, glass, and rock wool. The product differentiation stems from the use of either copper, lead or iron blast furnace slag, molten glass, or molten rock as the prime raw material in the manufacturing process.

The method of manufacture involves subjecting the molten material to high pressure blasts of air or steam to form fine fibers. These fibers may be used in either loose, batt or blanket, or block form, or be combined with clays or asbestos in insulating cement.

Formation of rigid slabs and blocks normally requires the addition of a binder material (resin or asphalt), compression of the fibers into the desired shape, and oven curing of the product. For pipe insulation, the felted fibers may be formed into variable thickness blankets faced on one or both sides, or they may be formed to dimensional standards allowing the nesting of multiple layers of different diameters.

The "rigid" forms are used for both low and high temperature applications while the batts and blankets and loose forms are generally used in building construction. Mineral fibers possess product advantages since they do not support combustion or bacteria, are odorless, dimensionally stable, and resist moisture and decomposition.

Organic fiber- Organic fiber products may be processed into loose, blanket, slab or board forms. The raw materials are wood cane or other vegetable fibers. Board forms

require reduction of the vegetable fiber to a pulp, washing, waterproofing and assembling them into board form. Thereafter, cooking, drying and cutting to finished size occurs. These forms are used as building board, roof and wall sheathing, tileboard and lath. In producing slab forms, the fibers may be mixed with magnesite or Portland cement. Slab forms are used for roof insulation, structural floor and ceiling slabs and for non-load-bearing partitions. In the loose form, the fibers are processed into wool-like fill and used for blown applications.

Cork- Although cork dominated the low-temperature insulation market for many years, it is now less extensively used. It is available in either granular or rigid form. Granular forms require grinding and grading of the raw cork for size. Slabs are manufactured by crushing, molding, compressing and baking the bark of the cork oak. The cork structure contains many voids of entrapped air, is odorless, possesses low conductivity and fair structural strength. It is combustible, however, and susceptible to deterioration by freezing of contained water and through termite attack.

Vermiculite- Vermiculite is a form of mica capable of great volume expansion by thermal vaporization of small quantities of water contained in the original mica structure. This volume expansion produces lightweight granules which, after size grading, are used as loose fill and as aggregate in lightweight insulating cements and plaster. With asphalt

as the binding agent, slab forms containing vermiculite are used for roof insulation.

Diatomaceous earth- Diatomaceous earth is composed of the microscopic remains of marine plants deposited in thick layers within the earth's crust. Natural diaomaceous earth serves as a high temperature insulation and may be used in loose or rigid form. Loose forms require grinding of the natural earth to granular or powdered consistency, while the rigid form involves blending of the calcined earth aggregate with Portland cement. Pipe covering and blocks may be manufactured by combining diaomaceous earth with asbestos fiber and bonding clay.

Foamed products- Foamed products are of organic and inorganic origins. Separate isolated air cells, which have high insulating value, create lightweight insulation impervious to water. This is its major advantage. Organic foamed products include polystyrene, resins, rigid foamed urethane and cellular hard rubber. Inorganic products include foamed glass and cement.

Expanded polystyrene consists of numerous air cells created by a pressure release extrusion process. The extrusion product may be machined or cut to block and pipe insulation products. It is a dimensionally stable, odorless, waterproof, lightweight, and possesses a good conductivity value. Several foamed resin products are widely available. They can be manufactured in place to acquire desired structural properties, i.e. inside walls. Because of this

characteristic, they are increasingly used in sandwich panel construction.

Cellular glass is a core-wall insulation in masonry construction, and may serve as roof insulation. It is produced in block or slab form, and also as a pipe insulation. It is incombustible, imprevious to water, acid and fumes, and is dimensionally stable. Cellular hard rubber, urethane and other plastic materials have been blown with air or a heavy gas to reduce its conductivity. These ligthweight products are used largely for pipe and vessel insulation applications. They are available from several manufacturers in either finished sheet and pipe forms, or as mass insulation to be cut and formed by the fabricator.

Carbonate of magnesia- The major chemical constituent of this product is magnesia carbonate obtained by the separation a nd extraction of calcium carbonate from dolomite. The product of the separation process (magnesia) is in the form of a wet slurry. It is then combined with asbestos fiber, molded, dried and machined to size. A standard mixture consists of 85 percent magnesia and 15 percent asbestos. The resulting product is used in the form of blocks, segments or pipe insulation. It has good insulation value and structural strength.

Hydrous calcium silicate- This is a high temperature material similar to the carbonate of magnesia described above. It is a slurry mixture of lime, silica and asbestos fibers.

It is molded and reacted in an autoclave, and then machined into pipe insulation, lagging and blocks. High pressure resistance enables it to replace "multiple" insulation products previously used in certain instances. This insulation possesses high compressive strength, and is resistant to abrasion and moisture.

Reflective materials- Reflective materials may be used individually or in conjunction with air spaces or other insulators to reduce the transfer or heat by radiation. Additionally, the material serves as a vapor barrier. The more commonly used reflective materials are aluminum foil, aluminum foil on paper, reflective blankets composed of multiple reflective surfaces, foil coated cotton, terne-plated steel sheets and aluminum coated gypsum board.

Cements- Although thermally not equal to other materials discussed above, insulating and lightweight cements are used principally for application to irregular surfaces, for finishing block or blanket insulations. These cements may also by used for "grading" roofs or as structural decks in buildings. Many cement compositions exist and include mineral wool cement, 85 percent magnesia cement, asbestos fiber and bonding clays, and calcined diatomaceous earth.

Lightweight aggregate cements are also considered construction insulators. Aggregates suitable for this use include perlite, pumice, vermiculite, slag and certain expanded shales, clays and slags. Cellular volcanic glasses,

as perlite and pumice, and expanded shale products require only crushing and sizing for aggregate usage.

Asbestos- Asbestos insulation is found in numerous forms including flexible sheet, rigid millboard, and blankets. Flexible sheets and blankets may consist of layers of asphalt asbestos felt cemented together, asbestos fiber enclosed between two layers of asbestos cloth and quilted to prevent settling of the fibers, or felted asbestos. Rigid products include millboard manufactured by mixing fiber pulp with binding materials and forming into sheets and vitrified alternate layers of flat and corrugated asbestos paper.

Miscellaneous materials- Miscellaneous insulation materials of more limited or specialized use include gypsum, cotton, fabricated panel cores, glass blocks, and felted hair. Gypsum is sometimes used in powdered form as a low temperature insulation. Felted cotton fiber, paper enclosed and treated for flame resistance, has been used in blanket or batt form. Softening of the fibers may occur, however, due to exposure to humidity. Fabricated panel cores are manufactured of paper, plastic, or metal honeycombs. Fibrous or foamed insulations within metal or concrete faced sandwich panels are relatively new. Hollow, translucent blocks of pressed glass, with decorative uses in construction, may also function as insulators. Felted hair is a low temperature insulation not widely used because of its lack

of moisture resistance, its combustible and compressible nature, and its odor and vermin susceptibility. The blanket material is fabricated from cleaned and graded cattle hair either felted alone or with asbestos, jute or other materials.

## Product significance

The materials discussed above enjoy various degrees of popularity. Mineral wool products in batt and blanket form, organic fibers and 85 percent magnesia in rigid form are the most widely used materials.

Vermiculite, diatomaceous earth, insulating cement and glass blocks have more limited application. Cork, felted hair and cotton fibers are decreasing in importance due to inherent disadvantageous physical properties.

Products with limited current usage, but with excellent use potential, include lightweight aggregate blocks and cement, and foamed organics and inorganics. Increased use of sandwich panel and other new construction techniques should expand the market for these materials.

## Product-climate relationships

Recent studies (1) (2) have shown that certain product-

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1 R.E. Platts, Insulation in Northern Building, (Division of Building Research, National Research Council, Ottawa, August, 1959).

2 Robert K. Betz, "The Economics of Home Insulation," (College of Mathematics Physical Science and Engineering, unpublished paper, April, 1965).

climate relationships exist for northern areas that have marketing significance. These studies are based on the accepted principle that selection of the optimum type and amount of insulation material requires balancing building cost against total heating cost for a given type of structure. Additional considerations for northern areas are the extreme variation and longer duration of cold temperatures, high material transportation costs, and the high cost of installation labor.

Study conclusions show that for extreme northern climates bulk insulations are usually preferable to reflective types; insulations with low heat conductivity (described in Appendix C) may be preferable even at higher market costs; lightweight material is usually preferable because of reduced shipping costs; and vapor barrier backings are not as reliable as sheet vapor barriers.

# MARKET STRUCTURE AND CONDITIONS INFLUENCING DEMAND FOR INSULATING MATERIALS

The regional demand for insulation is derived from construction of new buildings as well as the repair and modernization of existing ones. New construction is readily divisible into two segments; industrial construction using specialty insulating materials and construction of commercial and public buildings and homes where insulation of the general structure occurs.

## Construction in Alaska

The construction industry in Alaska is a relatively large segment of private business. In addition to employing seven thousand persons at seasonal peak, the industry is intricately connected with many wholesaling and retailing firms. Overall construction activity is difficult to measure, but follows roughly the pattern indicated in Table 2. Military construction, seemingly concentrated at the larger installations, has occurred at widely separated places since 1960 (Table 3 ). Private industrial building and household dwelling construction, however, is concentrated in the Anchorage-Fairbanks urban areas (Tables 2, 3, 5, 11.)

## Anchorage area

The Anchorage area is the distribution center for construction materials for the interior and southcentral parts of the state [1]. Insulating materials are sold

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(1) Southeastern Alaska receives shipments of insulation directly from Seattle.

TABLE 2
TOTAL CONTRACT EXPENDITURES AWARDED, AND DISTRIBUTION OF CONTRACTS AWARDED ACCORDING TO CONSTRUCTION SITE, 1949-1950, 1954-1955, 1957-1958 AND FY 1964+
(in thousands of dollars)

| | FY 1964+* | 1957-58 | 1954-55 | 1949-50 |
|---|---|---|---|---|
| Total Contract Awards | 41,545 | 169,127 | 159,143 | 147,173 |
| * Construction Contract Awards excluding design of facilities | 35,660 | 147,839 | 136,937 | 92,276 |
| Areas of Actual Construction | | | | |
| 1. Anchorage | 21,788 | 17,904 | 45,122 | 34,921 |
| 2. Fairbanks | 3,503 | 31,161 | 35,858 | 25,104 |
| 3. Other | 11,508** | 91,841 | 53,140 | 31,694 |

+ beginning with award dates of January 1, 1949, ending December 31, 1950 with a similar division for the next two periods after which the basic data are available again only for fiscal year 1964.

+* Not directly comparable to the three preceeding periods even as approximately 50 percent of a two year value because of changing format of the original reports.

** largely construction at offshore islands

Source: Alaska Division, United States Army Corps of Engineers

TABLE 3
SEASONAL EMPLOYMENT IN THE ALASKAN CONSTRUCTION INDUSTRY
BY LOCALITY, 1960, 1963-64

| Category of Employment | Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Monthly Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction Industry | | | | | | | | | | | | | |
| 1964 (Actual) | 1800 | 2000 | 2500 | 2600 | 3700 | 5300 | 6300 | 7200 | 7200 | 6000 | 3800 | 2800 | 4266 |
| (Index Number) | 42 | 47 | 59 | 61 | 87 | 124 | 148 | 169 | 169 | 141 | 89 | 66 | 100 |
| 1963 (Actual) | 1900 | 1800 | 2300 | 3800 | 4900 | 7000 | 8600 | 9500 | 9500 | 7500 | 5700 | 4000 | 5542 |
| (Index number) | 34 | 32 | 42 | 68 | 88 | 126 | 155 | 171 | 171 | 135 | 103 | 72 | 100 |
| 1960 (Actual) | 2200 | 2300 | 2500 | 3800 | 5700 | 8200 | 9300 | 10100 | 9600 | 8000 | 5300 | 3700 | 5891 |
| (Index number) | 37 | 39 | 42 | 64 | 96 | 138 | 158 | 171 | 162 | 136 | 90 | 62 | 100 |
| 1964 Construction Anch. (Actual) | 1040 | 1120 | 1100 | 1710 | 2360 | 3000 | 3720 | 4510 | 4620 | 4170 | 3190 | 2800 | 2440 |
| (Index Number) | 42 | 46 | 45 | 70 | 96 | 123 | 152 | 184 | 189 | 170 | 130 | 114 | 100 |
| Fairbanks (Actual) | 500 | 460 | 490 | 560 | 810 | 1090 | 1460 | 1690 | 1740 | 1650 | 740 | 500 | 976 |
| (Index Number) | 51 | 47 | 50 | 57 | 83 | 112 | 149 | 173 | 178 | 169 | 76 | 51 | 100 |
| All Industries 1964 Statewide (Actual) | 55700 | 56200 | 58500 | 60000 | 64800 | 69500 | 73400 | 74100 | 71600 | 67300 | 63900 | 61700 | 64725 |
| (Index No.) | 86 | 87 | 90 | 92 | 100 | 107 | 113 | 114 | 110 | 104 | 98 | 95 | 100 |

Sources: Alaska Department of Labor, Labor Market Newsletter

TABLE 4
EMPLOYMENT AND EARNINGS IN SELECTED INDUSTRIE'S IN ALASKA, 1960-1965
(IN THOUSANDS OF PERSONS AND DOLLARS, RESPECTIVELY)

| | 1964 | 1963 | 1962 | 1961 | 1960 |
|---|---|---|---|---|---|
| Contract Construction | | | | | |
| Per cent of Private Employment | 15.4 | 12.1 | 11.7 | 12.3 | 17.3 |
| Average weekly earnings ($) | 268.56 | 274.67 | 267.16 | 254.19 | |
| Average weekly hours | 43 | 45.4 | 44.9 | 43.6 | * |
| Average hourly earnings ($) | 6.24 | 6.05 | 5.95 | 5.83 | * |
| Transportation and Public Utilities | | | | | |
| Percent of Private Employment | 18.6 | 19.6 | 20.9 | 21.6 | 19.9 |
| Average Weekly Earnings ($) | * | * | * | * | * |
| Average Weekly hours | * | * | * | * | * |
| Average hourly earnings ($) | * | * | * | * | * |
| Lumber and Wood Products | | | | | |
| Percent of Private Employment | 5.8 | 5.8 | 5.6 | 4.8 | 6.7 |
| Average weekly earnings ($) | 173.81 | 166.38 | 155.47 | 156.66 | * |
| Average weekly hours | 43 | 41.7 | 40.7 | 42.0 | * |
| Average hourly earnings ($) | 4.04 | 3.99 | 3.82 | 3.73 | * |
| Total Private Employment | 36.4 | 34.6 | 33.9 | 33.3 | 34.1 |
| Government Employment | 28.2 | 27.0 | 25.0 | 23.8 | 22.5 |
| Statewide Employment Total | 64.6 | 61.6 | 58.9 | 57.1 | 56.6 |

*Not Available

Sources: United States Department of Labor, Employment and Earnings Statistics for States and Areas 1939-63, and supplements.

through factory sales branches and wholesalers in Anchorage to contractors and other dealer outlets. The share of current residential housing for Anchorage and Fairbanks is shown in Tables 6, 7, 8, 9. Commerical and governmental construction in these two areas is large, with roughly 80 percent occurring in Anchorage. Present plans depict a regular growth in construction activity for this urban area (2).

Fairbanks area

The Fairbanks construction market is substantially smaller than the Anchorage market. (See Tables 2, 3.) This wholesaling and retailing center serves the entire interior Alaskan market for construction materials. Repair and modernization of military buildings plus new government construction nearby have resulted in a relatively erratic-growth construction industry. State building plans and residential building have expanded regularly. The nature of the construction and type of building differs sharply between the two major market areas, a condition discussed later in this Chapter. The remaining urban areas in Alaska and isolated construction sites are served by the Fairbanks-Anchorage contractors and building materials dealers. The major exception is Southeastern Alaska. Construction activity there is serviced directly from Seattle-Portland.

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(2) See various economic base studies of the Anchorage area cited in the bibliography.

TABLE 5
ESTIMATED AVERAGE MILITARY EXPENDITURES BY STATES
Fiscal Year 1959 - 1961
(in millions of dollars)

| | Alaska | | Hawaii | Pacific States | Entire U.S. |
|---|---|---|---|---|---|
| | Percent | Value | | | |
| Military Payroll | 26.33 | 124 | 179 | 1,449 | 7,959 |
| Civilian Payroll in Military departments | 9.55 | 45 | 109 | 1,045 | 5,660 |
| Procurement Contracts | 12.53 | 59 | 25 | 3,718 | 16,867 |
| Construction | 17.20 | 81 | 23 | 308 | 1,726 |
| Operation & Maintenance | 34.40 | 162 | 234 | 1,894 | 10,404 |
| Total Non-payroll | 64.12 | 302 | 282 | 5,920 | 28,997 |
| Total Allocated Military Expenditures | 100 | 471 | 570 | 8,414 | 42,616 |

Source: "Federal Revenues and Expenditures in the Several States, "Library of Congress Legislative Reference Service, Washington, September, 1962.

Construction trends

Construction activity in Alaska, particularly since statehood in 1960, has been erratic. Overall construction activity still depends significantly upon public works expenditures, shown in part in Tables 6,7,8,and 9. With regard to general purpose insulating materials, building construction stems largely from government and commerical contracts and is dependent upon the flow of federal, state and local government funds. In addition, where much of the state-wide employment and personal income stem from governmental agencies, sales forecasting cannot be reliably accomplished. Postquake reconstruction has stimulated building construction in Anchorage where residential and commercial vacancy rates remain low (3).

Product-service requirements

The two insulation product categories (industrial and building) described in Chapter III are marketed under different conditions and require different dealer facilities.

Industrial insulations are marketed largely (75 percent) on a subcontract or competitive bid basis to general contractors or subcontractors as part of the "mechanical contract" of a structure. The contract (or bid) includes installation of the product by specialty crafts and therefore includes an appreciable charge for labor or "services."

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(3) Estimates of postquake reconstruction activity may be found in appropriate references cited in the bibliography.

TABLE 6

ANNUAL* FEDERAL PAYMENTS TO SEVERAL STATES LISTED ACCORDING TO PURPOSE OF EXPENDITURE

(in millions of dollars)



| To Purpose or Receiving Unit | Alaska Percent | Alaska Value | Hawaii | Pacific States | Entire U.S. |
|---|---|---|---|---|---|
| Personal Income | 40.58 | 239 | 354 | 5,391 | 39,914 |
| 1. Military related | 28.69 | 169 | 288 | 2,494 | 13,619 |
| 2. Other federal | 11.89 | 70 | 66 | 2,897 | 26,295 |
| Non-payroll Military*+ | 51.27 | 302 | 282 | 5,920 | 28,997 |
| State & Local Government | 7.30 | 43 | 23 | 800 | 6,668 |
| Interest & Other | .85 | 5 | 27 | 349 | 5,909 |
| Overall Total | 100.589 | | | | |

* Annual Average of FY 1959 to 1961.

\+ Military, transfer payments, private, interest.

*+ Such as procurement, construction, operating and maintenance expenditures.

Source: "Federal Revenues and Expenditures in the Several States," Library of Congress Legislative Reference Service, Washington, September, 1962.

Therefore, marketing of this type of insulation requires the maintenance of installation personnel by the dealer. Industrial insulation products are supplied by several national manufacturers (i.e. Fiberglas; Johns-Manville) and handled by only a limited number of local dealers.

The marketing of general building insulation does not include installation by the supplier. Blanket and batt materials comprise over three-fourths of general insulations, and may be installed by carpenters, general contractors, or individuals. These insulations are also supplied by a relatively small number of national manufacturers but are marketed by numerous dealers on a regional basis.

Loose fill insulations, once quite popular, are now used primarily in repair and reinsulation of existing dwellings and comprise no more than five percent of sales. They may either be installed by a dealer, general contractor, or individual.

Distribution channels

National manufacturers that produce standard insulating materials are decentralized, but situated wholly in the lower states. Insulation products sold in Alaska are shipped from factory sales offices and warehouses in the Seattle industrial area, irrespective of the exact point of manufacture. Insulation products often are shipped in "straight" cars of one insulation form, only occasionally cars of insulating materials and less often in mixed cars of building materials. Upon arrival in Alaska some

TABLE 7
PROJECTED COSTS OF STATE OF ALASKA CAPITAL CONSTRUCTION PROGRAM ACCORDING TO MAJOR FUNCTIONAL CATEGORIES, 1963_69
(in thousands of dollars)

| | 1968-9 | % | 1967-8 | % | 1966-7 | % | 1965-6 | % | 1964-5 | % | 1963-64 | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECONOMIC DEVELOPMENT (Highway construction, highway maintenance, harbors, airports, campgrounds, parks and tourist roads, fish protection and propagation) | 47614.8 | 93.4 | 47092.6 | 71.8 | 47348.8 | 78.6 | 47573.8 | 69.8 | 51458.9 | 68.4 | 54139.6 | 80.4 |
| EDUCATION (State operated elementary and secondary schools, vocational schools, University of Alaska) | 3204.0 | 6.3 | 8229.0 | 12.5 | 9336.0 | 15.5 | 18244.0 | 26.8 | 16427.0 | 21.8 | 7590.0 | 11.3 |
| PUBLIC SAFETY (State Police outposts, district headquarters buildings) | 106.2 | .2 | 106.2 | .2 | 70.0 | .1 | 106.2 | .2 | 123.0 | .2 | 70.7 | .1 |
| HEALTH AND WELFARE (Mental health, juvenile instit., hospitals & health fac., Pioneers Home) | - | | 10174.0 | 15.5 | 3349.9 | 5.6 | 2199.5 | 3.2 | 7222.0 | 9.6 | 4991.5 | 7.4 |
| GENERAL GOVT. building alterations) | 30.0 | .1 | 30.0 | - | 100.0 | .2 | 27.5 | - | - | - | 530.0 | .8 |
| TOTAL CONSTRUCTION VALUE | 50955.0 | 100 | 65631.8 | 100 | 60204.7 | 100 | 68151.0 | 100 | 75230.9 | 100 | 67321.8 | 100 |

Source: Department of Economic Development and Planning, A Capital Improvement Program for the State of Alaska, Juneau, February, 1963

TABLE 8

GENERAL EXPENDITURES OF SCHOOL DISTRICTS BY DESIGNATION OF OUTLAY, ALASKA AND "ALL STATES" 1962

(in $ and percent)



| | Alaska ($000) | Percent | All States Percent |
|---|---|---|---|
| 1. Operating Expenses | 18,829 | | |
| a. Personal Services | 13,500 | 62.8 | 62.6 |
| b. Interest on Debt | 1,218 | 5.7 | 3.0 |
| c. Other | 4,111 | 19.1 | 18.7 |
| 2. Capital Outlays | 2,665 | 12.4 | 15.8 |
| a. CONSTRUCTION | 1,830 | | |
| b. Equipment | 692 | | |
| c. Land and on existing structures | 143 | | |
| Total (1 - 2 above) | 21,494 | 100. | 100. |

Source: Bureau of Census, Census of Government.

TABLE 9

PER CAPITA INTER-GOVERNMENTAL EXPENDITURES BY PURPOSE, 1962

| FROM STATE TO | Alaska | Hawaii | All States |
|---|---|---|---|
| Per Capita | | | |
| General Local Governments (in dollars per capita) | 6.29 | 27.17 | 4.56 |
| EDUCATION | 51.13 | .03 | 34.99 |
| Highways | -- | .25 | 7.16 |
| Public Welfare | -- | 3.49 | 9.61 |
| Hospital | .38 | 3.64 | 0.52 |
| Health | -- | -- | 0.50 |
| Misc. | .01 | .86 | 1.59 |
| Total from State | 57.79 | 35.45 | 58.94 |
| Percentage distribution | | | |
| General Local Government | 10.9 | 76.7 | 7.7 |
| EDUCATION | 88.5 | 0.1 | 59.4 |
| Highways | -- | 0.7 | 12.2 |
| Public Welfare | -- | 9.8 | 16.3 |
| Hospital | 0.7 | 10.3 | .9 |
| Health | -- | -- | .9 |
| Misc. | -- | 2.4 | 2.7 |
| Total from State | 100.0* | 100.0 | 100.0* |

*does not total 100.0 due to rounding.

Source: "State Payments to Local Governments," Vol. VI (topical studies) No. 2, Census of Governments 1962. Washington: United States Department of Commerce, 1963.

reshipment and so-called top loading occurs in rail and truck transportation to interior Alaska. The various kinds of distribution channels for these products are presented in Figure 3. The modes of transportation are discussed later. A summary of the trade channels of national insulation manufacturers is shown in Appendix B.

Factory outlets- Almost all of the insulation products purchased for use in Alaska are ordered through factory outlets. Johns Manville and Owens Corning Fiberglas maintain factory outlets in Anchorage. These factory sales branches operate as full service distributors to dealer outlets. One full service independent wholesaler, a branch of the Palmer G. Lewis Corporation, carries the national brands of many manufacturers of building materials as a product line. This branch purchases Fiberglass and Johns Manville products through Anchorage factory outlets. The factory outlets probably wholesale or broker (order for direct-to-buyer delivery) 80 percent or more of all categories of insulating materials used in Alaska.

Wholesalers- In addition to the Palmer Lewis Corporation, independent lumber-building materials wholesalers abound in both the Anchorage and Fairbanks market. These independent wholesalers, typically marketing a broad line of building materials, sell directly to contractors, other retailers and household buyers. Insulating materials are a relatively small proportion of overall sales, and these distributors usually purchase any reliable national brand

TABLE 10
SUMMARY OF ALASKA WHOLESALING CONSTRUCTION MATERIALS
BY TYPE OF DISTRIBUTOR OUTLET AND LOCATION, 1954, 1958, 1963.

| Wholesale* Lumber and Construction Materials | 1963 No. of firms | 1963 Sales ($000) | 1958 No. of firms | 1958 Sales ($000) | 1954 No. of firms | 1954 Sales ($000) |
|---|---|---|---|---|---|---|
| 1. Total | 13 | 9,472 | 5 | N.D. | -- | -- |
| a. lumber, millwork | 5 | 4,016+ | 1 | N.D. | -- | -- |
| b. Construction materials | 8*+ | 5,456 | 4 | -- | -- | -- |
| 2. a. Merchant wholesalers | 10 | 4,016+ | 4 | 1,753 | -- | -- |
| b. Mfgr. Sales branches | 2 | -- | 1 | N.D. | -- | -- |
| c. Agents & brokers | -- | -- | -- | -- | -- | -- |
| All Wholesaling | | | | | | |
| 3. a. Anchorage | 121 | 94,722 | 102 | 74,804 | | |
| b. Fairbanks | 44 | 29,692 | 31 | 19,201 | | |
| c. Other urban areas** | 31 | 16,568 | 30 | 11,570 | 184 | 94,721 |
| d. Remainder of State++ | 95 | 39,623 | 91 | 32,367 | | |

* A wholesaler, by definition, sells 50 percent or more volume "at wholesale."

\+ Five firms listed above.

*+ Five merchant wholesalers in the construction material line.

** Juneau and Ketchekan

++ Cities of less than 5,000 inhabitants as of 1963.

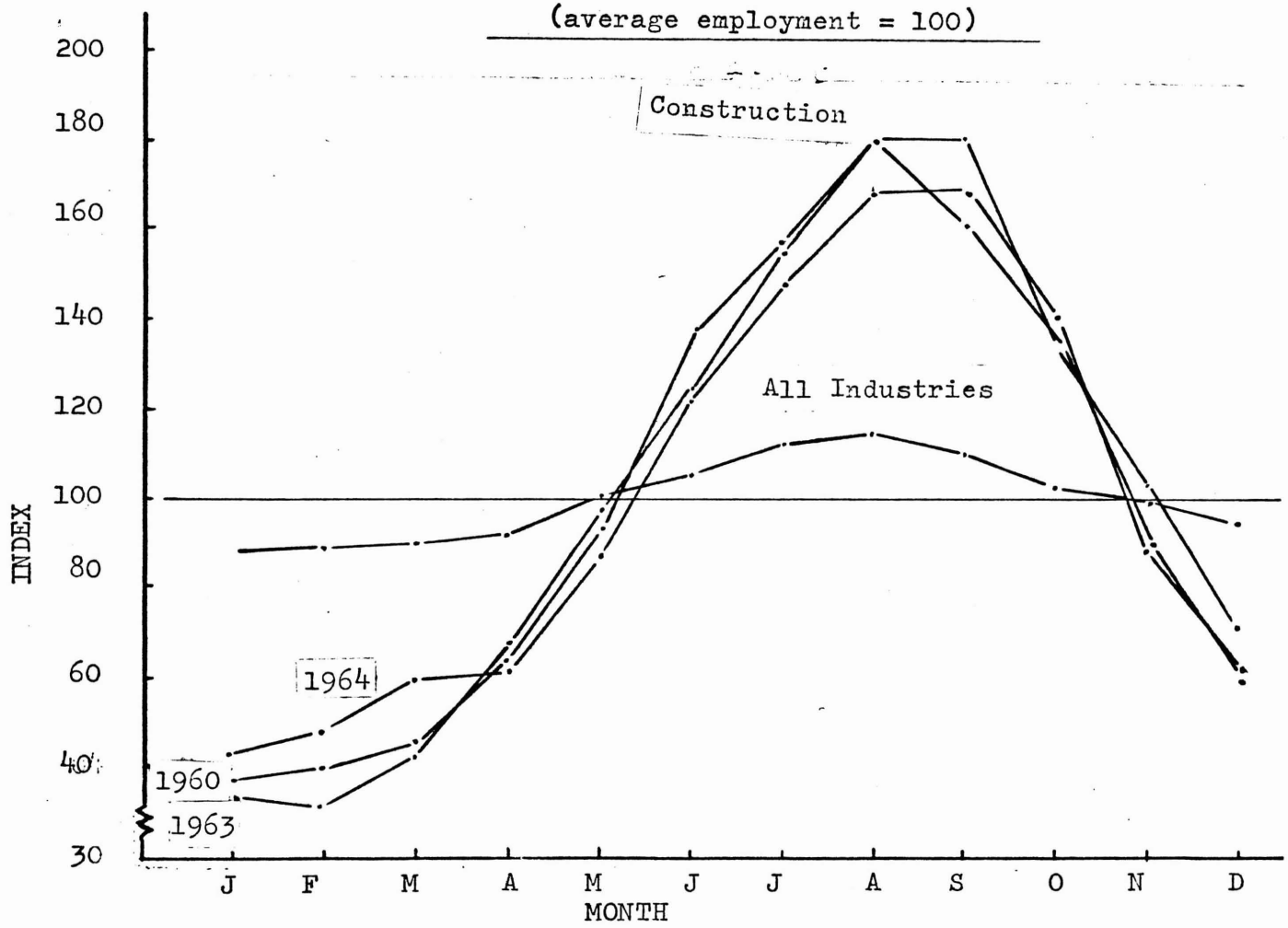
N.D. Not disclosed.

Source: Bureau of Census, Census of Business.

FIGURE 1

Seasonal Employment In The Alaskan Construction Industry - 1960, 1963, 1964

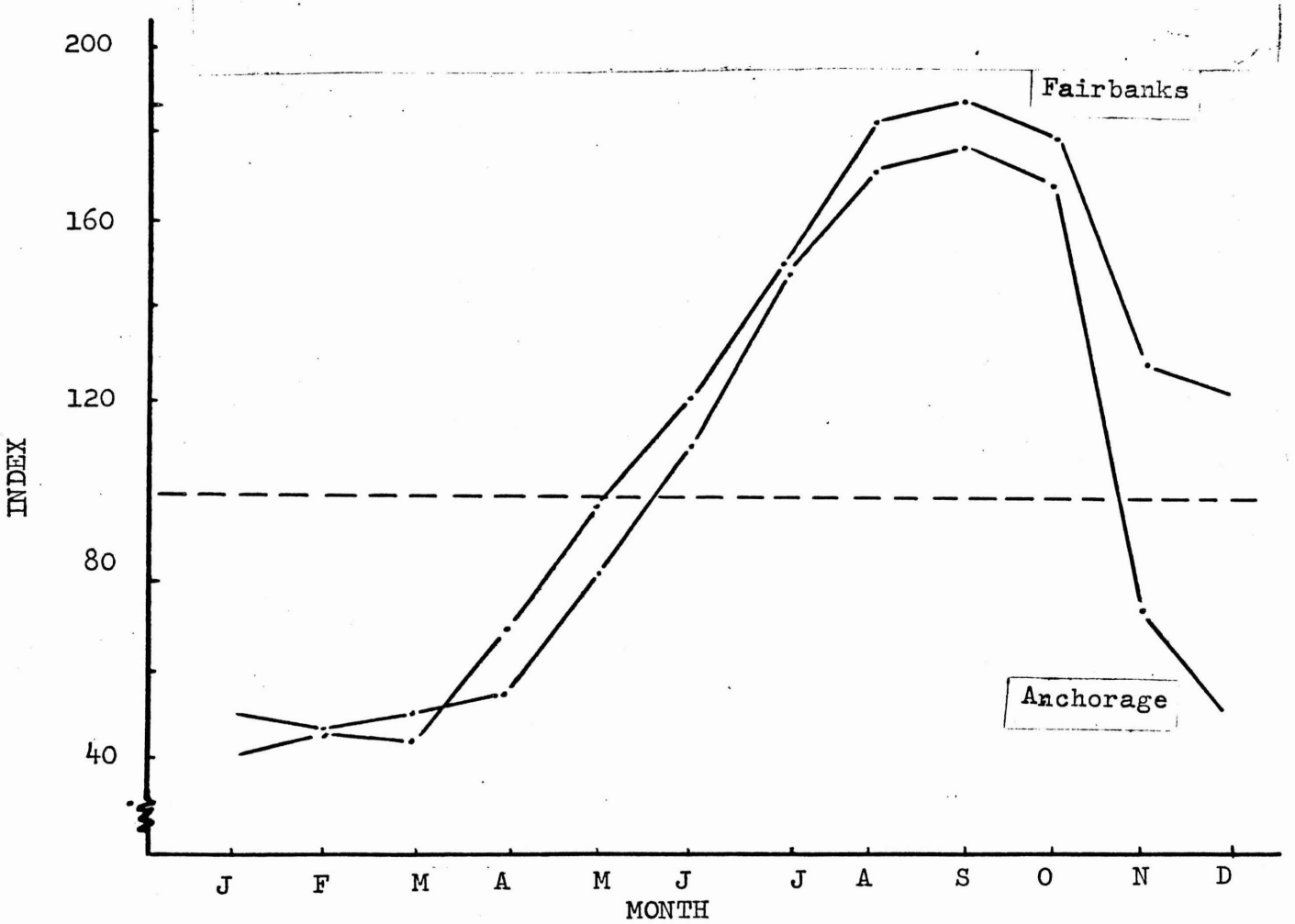
(average employment = 100)




Source: Table 2

FIGURE 2

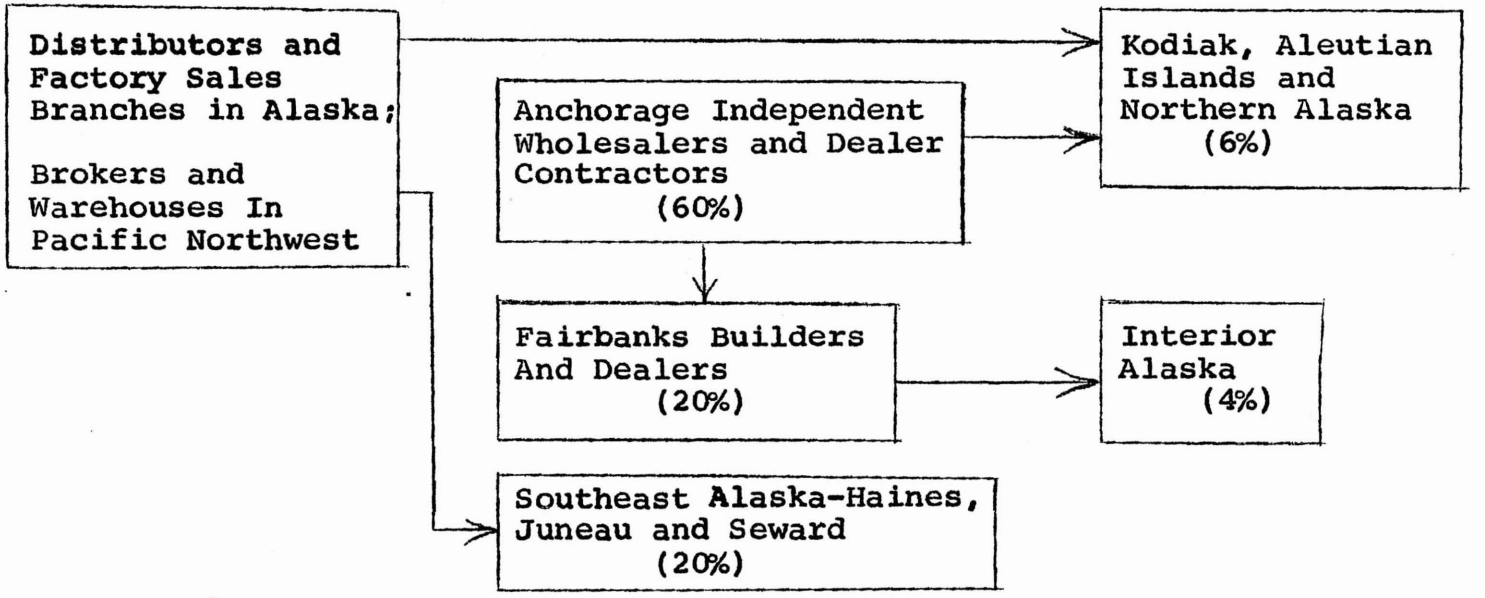
Seasonal Employment In The Anchorage and Fairbanks Construction Industries 1964-1965




Source : Table 2

Figure 3

Geographic Distribution of Insulation Material Sales, 1964-65



of insulation. The larger wholesalers order insulating materials occasionally directly from Seattle in carload lots by rail-ocean transporation. Insulation is rarely sold as an independent product because it is almost always purchased from these outlets along with complementary building materials as a part of a larger overall purchase.

(1) industrial insulation market-- Pipe insulation is not regularly sold through independent wholesalers. This product moves through the factory sales outlets which, as previously described, bid on contracts to install the industrial insulation.

(2) residential construction market-- Homeowner purchasers may buy directly from certain businesses classified as wholesalers, but also purchase from retail lumber yards. Price discrimination between household and dealer buyer classes does occur. This factor discourages customers bypassing dealers and protects informal dealer franchises. The Lewis Company sells to no household customers, only dealers.

An overview of commodity flows- The flow of construction materials from metropolitan warehouses to Alaskan wholesalers and users is depicted in the Figure on the following page. Construction and purchasing occur seasonally and very little inventory buildup is necessary in the fall out of which to sell during the winter and spring. Normally industrial and military contract construction are scheduled

TABLE 11
SUMMARY OF NEW RESIDENTIAL HOUSING
CONSTRUCTION IN ALASKA BY AREA, AS OF 1960

| Year Structure Built | State Total Housing Units | Anchorage Percent | Fairbanks Percent | Rest of State |
|---|---|---|---|---|
| 1959-1960 | 3,921 | 35 | 14 | 51 |
| 1955-1958 | 9,592 | 35 | 19 | 46 |
| 1950-1954 | 23,745 | 50 | 26 | 24 |
| 1940-1949 | 14,490 | 38 | 18 | 44 |
| 1930-1939 | 5,371 | 17 | 11 | 72 |
| 1929 & earlier | 10,067 | 8 | 10 | 82 |
| Total Housing Units | 67,187 | 36 | 19 | 45 |

| | Anchorage | | Fairbanks | | Rest of State | |
|---|---|---|---|---|---|---|
| Year Structure Built | No. | Percent | No. | Percent | No. | Percent |
| 1959-1960 | 1,371 | 6 | 564 | 4 | 1,986 | 6 |
| 1955-1958 | 3,359 | 14 | 1,849 | 15 | 4,384 | 14 |
| 1950-1954 | 11,924 | 50 | 6,068 | 48 | 5,753 | 19 |
| 1940-1949 | 5,578 | 23 | 2,559 | 20 | 6,353 | 21 |
| 1930-1939 | 900 | 4 | 598 | 5 | 3,873 | 13 |
| 1929 & earlier | 840 | 3 | 960 | 8 | 8,267 | 27 |
| Total Housing Units | 23,972 | 100 | 12,598 | 100 | 30,616 | 100 |

Source: Bureau of Census, Census of Housing.

TABLE 12
SUMMARY OF ALASKA RETAILING STATISTICS BY STORE CLASSIFICATION, 1958 and 1963

| | 1963 | | 1958 | |
|---|---|---|---|---|
| | No. establishments | Sales (in $000) | No. establishments | Sales (in $000) |
| Lumber & Building Material Dealers | 47 | 13,364 | 35 | 6,332 |
| Percent gain | 34% | 211% | -- | -- |
| a. lumber yards | 27 | 9,774 | -- | -- |
| b. building material dealers | 20 | 3,590 | -- | -- |
| Heating, Plumbing electrical dealers | 14 | 1,918 | 13 | 1,114 |
| Percent gain | 10% | 72% | -- | -- |
| Mail Order* | 18 | 10,500+ | (N.D.) | |

*Listed as non-store retailers, however, retail catalogue offices did exist in Anchorage and Fairbanks. Two permanent full-service retail stores are under construction as of September 1965.

+N.D. - not disclosed.

Source: Bureau of Census, Census of Business.

so that procurement of insulating materials occurs after contractors are known. With the bulk of government contract bids released during late June and early July, sufficient time remains for successful bidders to order insulation materials from out-of-state. Delivery occurs well prior to use. Thus, the larger orders for industrial pipe coverings and insulation occur only as government contracts are let. No large inventory buildup occurs in Alaska, and out-of-state firms are as well equipped as domestic ones in bidding on these contracts.

The pattern of seasonal inventory buildup in general insulating materials closely parallels the purchasing and transportation situation for other building materials. Ocean transportation, which arrives irregularly from November until April, requires the warehousing of building materials which are sold in small quantities throughout the off-season months. The factory sales branches and independent distributors store supplies of insulation for the winter slack season of selling. Typically, dealers purchase only as minimum stocks are reached, and contractors carry no building materials inventory.

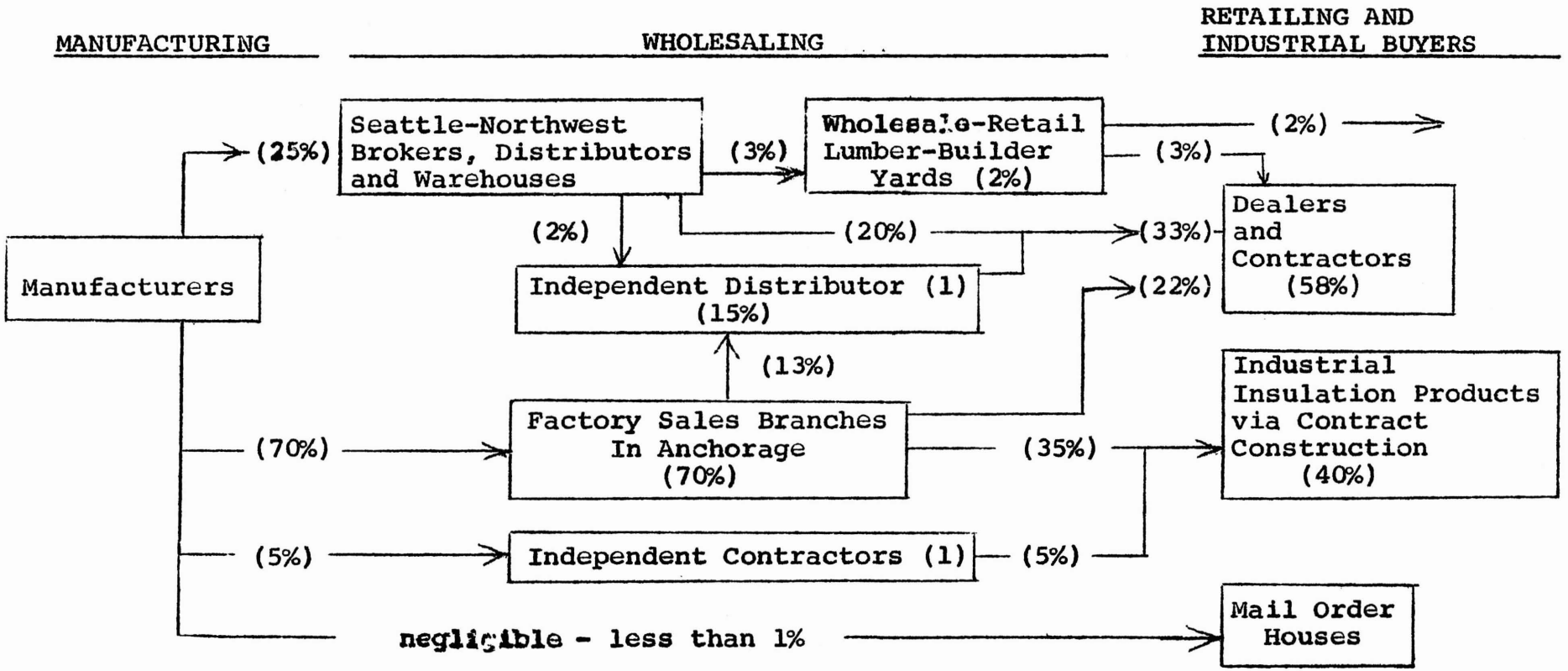
(1) transportation costs-- Because of its light weight, it is popularly believed that the transportation cost to total purchase price of insulation materials is high in Alaska. However, in examining the ways in which insulation materials are shipped into the state, it is readily apparent that the Seattle-to-Anchorage transportation

amounts to no more than five percent of wholesale price in Anchorage, and a substantially smaller proportion of retail price. In addition, since insulating and other construction materials may be ordered directly from Seattle, the existing regional wholesale-retail prices are not significantly higher than f.o.b. Seattle prices. Fairbanks wholesale outlets reported that freight charges amounted to roughly 30 percent of material costs, and a much smaller proportion of selling prices.

In the case of Fairbanks, insulation materials are ordered frequently in "mixed" cars where the relatively light insulation fills the top space of transportation units predominantly loaded with heavier construction materials. In this way the transportation cost increment (net over the cost incurred if no insulation was shipped) is very small.

(2) sales turnover-- One condition vitally affecting the commodity flows of construction materials in Alaska is the inventory investment. Wholesalers and dealers alike are reluctant to order these kinds of materials until it is readily apparent the products may be sold within the season. Dealers purchase from in-state wholesalers predominantly because they are unwilling to take the risk of large orders directly from metropolitan areas. Contractors purchase locally except when they receive very large construction contracts, i.e. prime military construction contracts. In this way, the sales-to-inventory turnover of the

**FIGURE 4 ***
**INSULATION COMMODITY FLOWS TO ALASKA**
**1964-65**




* According to Quantity (e.g. footage, space, weight)

Source: Authors' survey and estimates.

distributing firms in trade channels limit the insulation order size. Orders are usually just sufficient in size for current needs. With the more rapid and dependable delivery to Alaska by Sea Land and other competing carriers, the time lag for wholesale delivery is controlled at a minimum of six weeks for Seattle-to-Anchorage orders. Presently, orders are arriving within 20 days. This situation has reduced the need for costly inventory investment, has resulted in more efficient distributors and has generally benefited the construction industry.

Market size and composition

Several factors preclude detailed determination of the quantities of specific insulation products sold in Alaska. Chief among these are the practice of marketing industrial insulation on an installed basis, the broad nature of existing transportation and sales statistics, the extremely competitive nature of the industry, and the extent of product substitution possible.

As a general rule, however, general building insulation costs approximate three percent of building material costs for commercial and residential construction, while industrial insulations approach ten percent of structural building contracts (approximately one-half of one percent of total industrial construction costs).

Data analysis and interviews with major industry participants show that the sales of industrial insulation varies from $400,000 to $700,000 annually of which

40 percent is installation labor cost. The market for commercial and general insulation materials has exceeded $150,000 annually since 1960, with current annual statewide sales of $250,000.

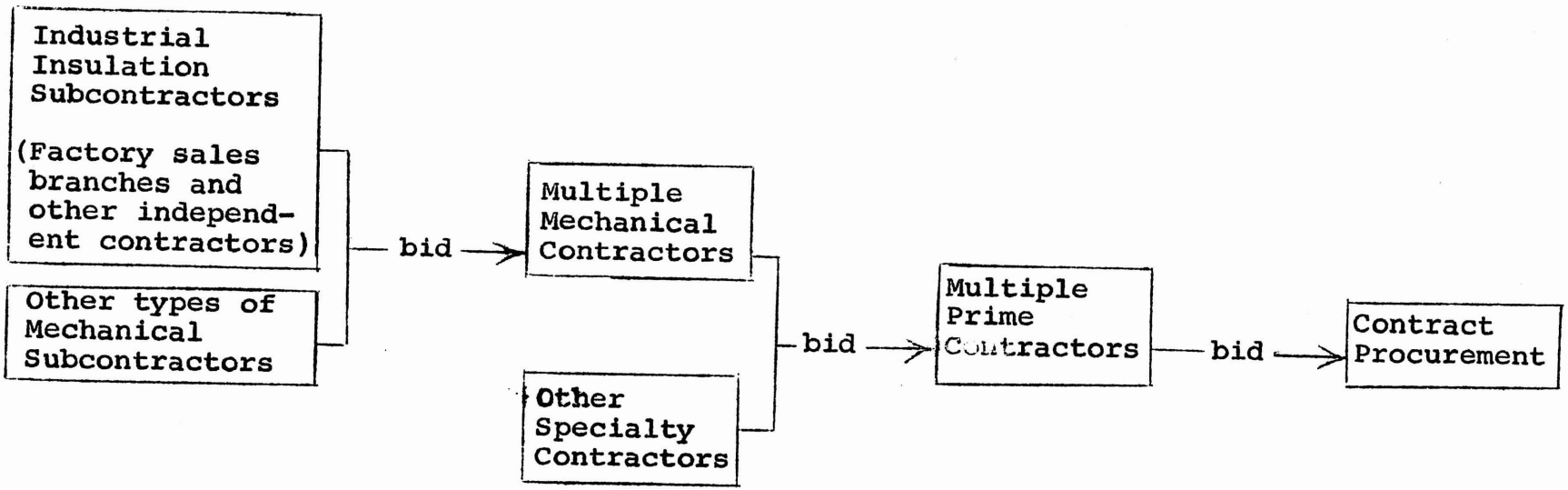
A critique of the competitive situation

Manufacturers compete indirectly with one another in Alaska. They are represented by factory outlets and by independent wholesalers. These distributors carry out the effective competition in the regional marketplace. Factory branches compete with one another, and with one Seattle-based independent insulation contractor for military-commercial insulation contracts. These same factory outlets and one wholesale outlet compete for dealer outlets. Dealers have the choice of purchasing from two or more regional wholesalers as opposed to ordering directly from metropolitan areas. Thus, the effective competitive environment in the insulation materials market in Alaska occurs principally within the region.

(1) bidding on government contracts and subcontracts--The market for industrial insulating material (discussed earlier) is essentially determined by "competitive" bid. Pipe insulation is not a "prime contract." It is, in fact, a bid to sub-contractors, who, in turn, bid with prime contractors. It is therefore popularly called "third tier bidding." (Figure 5). In the early 1960's a bidding depository was used in Anchorage for nearly one year. The purpose of the depository was to prevent prime and secondary

Figure 5

Third-Tier Bidding Practice
Industrial Insulations



contractors from negotiating sub-contract bids once the bidding deadline passed. This renegotiation occurred after the prime contractor received an award, and before construction was under way. The bid depository does not now operate in Alaska.

(2) gross operating margins and entry into contracting and selling-- Gross margins of industrial insulation products tend to be relatively high. In the late 1950's operating margins of 50 to 75 percent and more were not uncommon. At that time there were four firms bidding on industrial insulation contracts as opposed to three at present. Gross profit margins have been bid down over the intervening period to 30 percent and less. This reduction in margin marks more active price compeitition among factory outlets as government contracting has fluctuated annually. Because the two large factory outlets with warehousing space now dominate the industrial insulation sales in Alaska, entry into this segment of the market is effectively blocked.

Purchase prices differ from one lumber yard and dealer to the next. The differences in purchase prices are only moderate, however, because almost all dealer outlets purchase insulation materials from local wholesalers. Price differences between outlets are significant within cities. This is attributed largely to the fact that insulation is usually sold as a small portion of an overall sale and is a limited part of a retailer building materials product

TABLE 13
SURVEY OF RETAIL BUILDING MATERIAL
PRICES OF LUMBER DEALERS IN ANCHORAGE AND FAIRBANKS,
as of June 1965

| Building Materials Product Category 1/ | Anchorage Dealers 2/ | Fairbanks Dealers 2/ |
|---|---|---|
| Fir studs (2 x 4's) | | |
| average price 3/ | $153 | $177 |
| price range | $110 - 175 | $165 - 180 |
| Spruce finished | | |
| average | $135 | $147 |
| range | $135 - 155 | $130 - 158 |
| Insulation Foam (4 x 8) | | |
| Average | .16 | .18 |
| range | .10 - .21 | .17 - .185 |
| Fiberglass (2 x 10; 2 x 16; 3 x 16) | | |
| average | .08 | .06 |
| range | .064 - .10 | .075 - .105 |

1/ Product standards chosen to observe if insulation products were comparably priced to other building materials shown above.

2/ In Anchorage, eleven dealers were surveyed; in Fairbanks nine dealers were included. All of the larger lumber dealers in both cities are included.

3/ The arithmetic average of survey prices shown here is, in fact, an average of relatives price though not shown in index number form. Weighting was equi-proportional to the number of dealers.

Source: Authors' survey and computations.

line. Retailer prices in Anchorage and Fairbanks do not differ materially, and transportation costs seem to have been less significant than initially high gross margins. Entry into retailing is relatively "easy," subject to the overall trends observed in larger scale merchandising (See Table 13 and Appendix D.)

(3) product quality and service-- Outlets in Alaska sell entirely national brands or standardized insulation products. Basically the product quality is little different than observed elsewhere in the United States. Industrial insulation products, while standard, probably are more expensive in Alaska due to higher labor costs and the short construction season.

(4) pricing behavior-- General insulation materials are priced by the factory (for the factory sales branches) and represent the dealer purchase prices. These costs generally do not fluctuate seasonally. Quantity discounts are allowed, although few firms are eligible for them. Separate prices are charged dealers as opposed to household buyers, a typical form of price discrimination. Dealer prices vary significantly as shown in Table 13. None of the industrial insulation products are not priced publicly as such. These firms, along with roofing companies, merely bid on given insulation jobs.

(5) transportation costs and methods-- Insulation materials are shipped from manufacturing locations in the industrial United States and from regional warehouses

to Anchorage or Southeast Alaskan ports. Appendix B itemizes several production locations. Accordingly, insulation is usually shipped rail/sea or truck/ocean vessel (Sea Land) to Anchorage. Transportation costs amount to only $1.55 to $1.60 per hundred pounds. Almost 90 percent of shipments arriving in the Port of Anchorage are so-called "straight cars." Nearly 60 percent of the general purpose insulating materials are then reshipped from Anchorage to Fairbanks (and interior), Kodiak Island and points nearby. Insulating materials are moved within Alaska principally by railroad although truck transportation is increasingly significant. Dealer delays in delivery have been much shorter from Anchorage to Fairbanks via truck, a condition of paramount importance to the construction industry. Southeastern Alaska and ports outside Anchorage comprise roughly 20 percent of the building materials received in the state.

# A SURVEY OF ALASKAN RAW MATERIAL SUPPLIES AND INSULATION MANUFACTURING OPPORTUNITIES

## A survey of raw material deposits

The State of Alaska contains numerous deposits of raw materials, which under favorable economic conditions, could be utilized as raw material for the manufacture of insulation products. The following paragraphs list and briefly describe some of the more accessible deposits. Each deposit described is also indexed by letter on Figure 6.

Mineral wool materials- Previous work by the United States Bureau of Mines has shown that several limestone and shale deposits of sufficient quality for the manufacture of mineral wool exist within Alaska. The requisite material components include silica (35-50%), alumina (5-20%), lime (20-40%) and magnesia (5-20%). These components may occur in the proper proportions in a single rock or may require the blending of several rock types.

The Windy-Cantwell area (A), shown on Figure 6, contains shale and limestone deposits which make a high quality mineral wool when blended in the proper proportions. Additional areas investigated by the Bureau of Mines which may contain rock types with the necessary components include Anchorage (B), the West Fork of the Chulitna River (C) and Homer-Seldovia (D). Favorable deposits in the Anchorage area include the Potter limestone, graywacke or argillite; in the Chulitna River limestone and argillite; and in


FIGURE 6

**Location Map of Alaskan Occurrences**

**of Insulation Raw Materials**

Homer-Seldovia the Seldovia limestone and Homer clay.

Asbestos- Although asbestos is widely distributed in Alaska, three major areas could have possible significance. These are the Cosmos Hills and Jade Hills in the Kobuk River area (E), Admiralty Island (F), and Lemesurier Island (G) in southeast Alaska.

These deposits are either of the fracture filling, lens or pod type and probably do not contain large reserve tonnages. While limited production of asbestos occurred during World War Two in the Cosmos Hills area, no additional minable reserves are known in the area. The limited present availability of the expected host rock would seem to preclude discovery of deposits with substantial reserves.

Gypsum- Gypsum occurs in two known locations in Alaska; at Sheep Mountain (H), on the Glenn Highway near the head of the Matanuska Valley, and at Iyoukeen Cove (I) on Chichagof Island in southeast Alaska.

The deposits at Sheep Mountain are composed of blebs and stringers. Inferred reserves of 25 to 30 percent gypsiferous rock approximate 350,000 tons. The low industrial quality and complex mineralogy of this material now preclude wide usage. In 1957 fifty tons of material were produced by an Anchorage building materials concern that later ceased production.

The Iyoukeen area contains two separate deposits of gypsum interbedded with limestone. Although previous production from deposits, between 1902 and 1926, totaled

500,000 tons, it is reported that the producing deposit was largely depleted. A second deposit has been developed extensively but no estimate of the reserve is available.

Lightweight aggregate materials-

Diatomaceous earth- Several deposits of diatomaceous earth occur north of Kenai (J) along the east shore of Cook Inlet. It is estimated that 200,000 cubic yards of material, containing 65 to 75 percent diatomite, are contained in one readily accessible deposit.

Bloating shales and clays- Certain clays and shales occur in nature which possess the property of expansion upon the application of heat. The product of such expansion is a lightweight semivitrified clinker used as an aggregate for lightweight concrete, and for concrete blocks with insulation properties.

Deposits which may be suitable for such use include shale deposits in the Kings River and Sutton areas (K) of the Matanuska Valley, and argillaceous deposits at Indian River (L) on the Alaska Railroad and at Millers Landing (M) near Homer.

Pumice and pumicite- Pumice is a highly cellular volcanic glass formed in nature by the subjection of lava to rapid heat and pressure changes. Pumicite is a finer grained volcanic ash formed under closely related conditions.

The Alaska Peninsula-Cook Inlet region possesses previously mined pumice deposits in Katmai National Monument (N) and at Augustine Island (O). Limited production

of pumice occurred from both deposits in the late 1940's for fabricating lightweight building blocks. The Augustine Island deposits are small and present mining and transportation difficulties are serious, while those in the Katmai area are larger and more favorably located.

Perlite- Perlite is a volcanic glass containing water in its laminar structure capable of expanding the perlite volume upon heating. The expanded product may be used as a lightweight aggregate. A high quality deposit, possibly significant, occurs at Sugar Mountain hear Healy (P). It apparently contains limited reserves. Other small low-grade deposits occur at Polychrone Pass and Calico Creek Mountain in McKinley National Park.

Manufacturing situation

The limited demand for insulation products in Alaska greatly reduces regional manufacturing opportunities. In addition, the high cost of transportation of specialty raw materials to Alaska would seem to preclude most local product fabrication operations. A significant exception to this statement is the manufacture in Fairbanks of expanded plastic insulation slabs from raw materials supplied in concentrated form.

Other insulation manufacturing opportunities do exist for the small scale manufacture of two products. These opportunities for manufacturing should be explored additionally with detailed cost studies, assuming certain percentages of the Alaskan insulation market could be captured.

(1) A small scale rock wool plant using a limestone-shale raw material blend and located in the Healy area. This operation would probably prove to be economically feasible since the major expense in mineral wool manufacture is in conversion of the basic raw materials to the molten state, a better alternative would be the utilization of slag from a proposed smelter in the Kenai Peninsula area to manufacture a slag wool product.

(2). The manufacture of lightweight block and light-weight aggregate cement is a very attractive possibility at this time. In view of the declared need for such a product by designers and builders, the trend toward increased use of these materials in construction, and the ready availability of bloating shale and pumice raw materials, a detailed cost study should be undertaken in the immediate future. Cement block and ready-mix companies with established marketing channels in the Anchorage-Fairbanks area could feasibly manufacture this product at present. Neither mineral wool or lightweight aggregate products would have to support the total cost of a manufacturing enterprise if they could be manufactured as a by-product and sold through existing construction material trade channels.

Manufacturer entry and purchase of Alaskan raw materials

A survey of national manufacturers, conducted in the course of this investigation, showed that the creation of regional branch plants is unfavorable at this time. In

addition, no interest was shown by them in securing Alaskan raw materials for stateside manufacturing operations, since more favorable raw material locations exist.(Table 14.) Eighty percent of the companies surveyed indicated no desire to obtain insulation products manufactured in Alaska for sales through their existing Alaskan trade channels. The survey conclusively demonstrated that national manufacturers are content with their current Alaskan marketing arrangements, and that new manufacturing endeavors would have to derive their impetus from interests within the state.

TABLE 14
SURVEY OF PRODUCER INTEREST IN ALASKAN RAW MATERIALS
AND MANUFACTURED INSULATION PRODUCTS, AS OF JULY, 1965

| Category of Question | Percentage of Responses | | |
|---|---|---|---|
| | yes | no | unknown |
| Companies interested in Alaskan raw materials for manufacturing insulation | -- | 76 | 14 |
| Sufficient raw materials exist in other States | 80 | 20* | -- |
| Interested in Procuring Alaskan Insulation Products for distribution | -- | 80 | 20 |

* Cork insulation which is generally not in sufficient supply anywhere in the United States.

Source: Appendix B.

## Design of the survey of insulation manufacturers

The names and central office locations of insulation manufacturers were taken from the Thomas Register of Manufacturers and a factory procurement trade manual for retailers. All firms listed in the two sources were mailed questionnaires, a copy of which is shown as Appendix B.

Six national manufacturers produced mineral insulation products at various locations in the "lower states." These six distribute their insulation products to widely dispersed regional consumer and industrial markets. Any manufacturer which sells these products exclusively to a closed industrial or private brand market might be excluded from the survey. The six manufacturers are cross-classified as follows.

| Classification | No. of firms | |
|---|---|---|
| 1. Sell insulation materials in Alaska | 3 | (4)* |
| 2. Do not sell insulation materials in Alaska | 2 | |
| 3. No reply | 1* | |
| | 6 | |

* The firm shown above as "no reply" does sell insulation products in Alaska. Although it did not reply to the questionnaire, its factory outlet in Anchorage was examined.

Of the firms surveyed, some did not produce mineral insulation products. Their classification, along with the previous six manufacturing firms, is depicted as follows.

| Category | No. of firms |
|---|---|
| 1. Does produce mineral insulation products | 6 |
| 2. Does not produce mineral insulation products | |
| (a) Produces competing insulation products | 5 |
| (b) Produces no insulation products or have withdrawn from manufacturing | 7 |
| | 12 |
| TOTAL SAMPLE | 18 |

Seven questionnaires were completed, representing manufacturers who do and might soon distribute insulating materials in Alaska. Five of these produced mineral insulations and two major competing product lines. These seven reports comprise a major segment of the mail survey which was supplemented by field interviewing.

APPENDIX B



UNIVERSITY OF ALASKA
MINERAL INDUSTRY RESEARCH LABORATORY

Mineral Wool Insulation Study (1965)- Survey of Manufacturers

Producer Designation

Firm Name: Consolidated results - see Appendix A

Location: _____

Mineral insulation is produced at the following locations...

Port Kennedy, Pa.; Berlin, N. J.; Kansas City, Mo.; (None).
Beaver Falls, Pa.; Lockload, Ohio; Pensacola, Fla.

Product
( X ) the following insulation products which you manufacture..

Fill

2 rock wool
2 glass wool
2 slag wool
1 vermiculite
_____ granulated coric
_____ powder gypsum
1 other (specify)

Blankets

3 mineral wool
2 glass fiber
_____ silica fiber

Slabs or blocks

3 mineral wool
_____ cellular glass
_____ asphalt vermiculite
1 diatomaceous earth or silica
_____ foamed glass

Other

3 combination mineral and other materials (i.e. asbestos fiber)
2 structural insulating boards
2 cement insulation
_____ reflective insulations

Note from DGGS: It is not known if there is a page 59. The page was not found in searching through two different copies of this report.

Marketing (applicable only to mineral insulation products)
( X ) mark if the answer is yes...

Your insulation products are sold:

__5__ along with other building materials as a part of a broader product line.

__2__ frequently in single bulk shipments to wholesalers/ distributors.

__3__ direct to wholesalers.

__2__ direct to dealers.

__1__ to both wholesalers and dealers.

__6__ directly to contractors.

Apparently purchasers use these insulation products:

__4__ Largely for residential construction.

__6__ significantly for business construction.

__2__ for other purposes (not obvious) i.e. repair and modernization of dwellings, etc. Please specify...

Your distribution channels are:

__2__ entirely company-operated to the dealer level (i.e. not through independent wholesalers/distributors).

__4__ significantly through large contractor-builders that do their own warehousing.

Regarding the Alaskan insulation materials market

__4__ 1. We sell to Alaskan construction businesses.

_____(a) Sell directly to dealers in Alaska.

__3__ (b) Sell only to wholesalers there or distributors that, in turn, serve Alaskan buyers.

__1__ (c) Yes to #1, but have no idea about secondary outlets and subsequent resale of the product.

__1__ 2. The Alaskan regional market is small and of little concern to our company.

Are there any trends apparent in the insulation business? How would they affect the outlook for mineral insulation? (fill in as you see fit).

## Insulation effectiveness criteria

Many characteristics are used to evaluate the effectiveness of one insulation material relative to another. Some are inherently tied to unique application conditions as moisture, vermin and abrasion resistance, or structural strength. Others are indicative of material insulatory properties independent of utilization conditions. Three basic material properties, however, normally serve as common measures of insulation effectiveness. They a re thermal conductivity, thermal conductance, and thermal transmittance.

Thermal conductivity (k)- Normally known as the "k" factor, conductivity denotes the time rate of heat transfer to conduction through a unit area of homogenous material of unit thickness, when a unit temperature difference is maintained in a direction perpendicular to that area. It is usually expressed as the amount of heat (BTU's) transferred in one hour, through one square foot of material, one inch thick, for a temperature differential of one degree Fahrenheit.

Thermal conductance (C)- Thermal conductance is the time rate of heat flow through a unit area of material or material combinations when a unit temperature differential exists between the two outer surfaces of the material. It is not dependent on material thickness or homogeneity and

is expressed as the amount of heat (BTU's) transferred per square foot, per hour, per degree Fahrenheit.

Thermal transmittance (U)- Commonly known as the "U" factor, thermal transmittance denotes the time rate of heat transfer per unit area of roof, wall, floor or other structural or insulation component, when a unit temperature difference exists between the fluids in contact with the opposite material surfaces. A common unit is BTU per square foot, per hour, per degree Fahrenheit.

Thermal resistance (R)- Thermal resistance is the reciprocal of thermal conductance (C) as defined above.

# APPENDIX D

## SUMMARY OF INSULATION COMMODITY FLOWS VIA THE ALASKA RAILROAD

The data presented in Appendix D, denoted as D-1 through D-3, are largely experimental. An analysis of information available from the Alaska Railroad Station List Tariff is still in preliminary stages. Basically, it represents a census of commodity flows by product designation to various points along the Alaskan Railbelt as destinations. Although it is a census of the shipments from Seward-Whittier, it omits entirely rail shipments through the Port of Anchorage and onto the Alaskan Railroad and would misrepresent shipments to Anchorage wholesalers who later sold the products to interior Alaska customers. In addition, it omits any truck pick-up at Seward, and should not be compared directly to inbound traffic reported by the United States Army Corps of Engineers in its Waterborne Commerce of the United States annual report. In spite of the above limitations, it does provide quantified information concerning the minimal tonnage of insulation commodity flows, and clearly identifies transportation costs of insulation moved by rail within Alaska.

Appendix D-1

FREIGHT TRAFFIC FOR FOUR ALASKAN PORTS
1950-1963
(Short Tons)

| Year | Tons Total | Seward Tons | Seward Percent of Four Ports | Anchorage Tons | Anchorage Percent of Four Ports | Whittier Tons | Whittier Percent of Four Ports | Valdez Tons | Valdez Percent of Four Ports |
|---|---|---|---|---|---|---|---|---|---|
| 1963 | 1,157,956 | 613,369 | 53 | 381,709 | 33 | 120,856 | 10 | 42,022 | 4 |
| 1962 | 1,196,047 | 670,037 | 56 | 351,963 | 29 | 132,427 | 11 | 41,620 | 4 |
| 1961 | 1,072,995 | 631,209 | 59 | 267,679 | 25 | 119,212 | 11, | 54,895 | 5 |
| 1960 | 1,063,346 | 628,422 | 59 | 246,758 | 23 | 115,420 | 11 | 72,746 | 7 |
| 1959 | 938,812 | 556,124 | 59 | 221,387 | 24 | 118,831 | 13 | 42,470 | 4 |
| 1958 | 852,316 | 450,705 | 53 | 214,281 | 25 | 129,969 | 15 | 57,361 | 7 |
| 1957 | 863,055 | 529,834 | 61 | 170,006 | 20 | 100,588 | 12 | 62,627 | 7 |
| 1956 | 1,068,586 | 633,489 | 59 | 201,139 | 19 | 175,538 | 16 | 58,420 | 6 |
| 1955 | 929,045 | 524,796 | 57 | 170,195 | 18 | 139,439 | 15 | 94,615 | 10 |
| 1954 | 952,206 | 565,013 | 59 | 170,309 | 18 | 120,606 | 13 | 96,278 | 10 |
| 1953 | 927,069 | 587,201 | 63 | 137,192 | 15 | 131,758 | 14 | 70,918 | 8 |
| 1952 | 1,004,625 | 549,408 | 55 | 122,264 | 12 | 237,297 | 24 | 95,656 | 9 |
| 1951 | 1,106,230 | 572,470 | 52 | 110,756 | 10 | 297,421 | 27 | 125,583 | 11 |
| 1950 | 831,283 | 428,953 | 52 | 50,742 | 6 | 265,625 | 32 | 85,963 | 10 |

Source: United States Army Corps of Engineers, Waterborne Commerce of the United States

Appendix D-2

SUMMARY OF RAILROAD INSULATION COMMODITY FLOWS
FROM SEWARD & WHITTIER TO ALASKA RAILBELT POINTS,
1962-1964

| From: SEWARD-WHITTIER | Destination: Anchorage | Fairbanks | Other Interior Points |
|---|---|---|---|
| **1964 *** | | | |
| No. Cars | 37 | 17 | 5 |
| Weight (lbs) | 604,236 | 352,546 | 127,951 |
| Freight Cost + | $10,692 | $10,794 | $3,194 |
| **1963** | | | |
| No. Cars | 50 | 43 | 1 |
| Weight (lbs) | 789,070 | 756,332 | 28,375 |
| Freight Cost | $11,773 | $22,136 | $797 |
| **1962** | | | |
| No. Cars | 27 | 20 | -- |
| Weight (lbs) | 464,261 | 361,246 | |
| Freight Cost | $7,668 | $8,559 | |

* Preliminary unaudited figures for the periods shown.

\+ Gross revenues to the Alaska Railroad which is here considered equivalent to the buyers' rail transportation cost less handling charges.

Source: Author's computations from printout of intraline shipments, Station List Tariff, of The Alaska Railroad, United States Department of the Interior.

Appendix D-3

INSULATION COMMODITY FLOWS BY THE ALASKAN RAILROAD ACCORDING TO RAILBELT DESTINATION FOR THE PERIOD 1962-1964

From:
SEWARD-
WHITTIER

| To: | No. Cars | Weight (in lbs) | Freight Cost |
|---|---|---|---|
| Anchorage: | 114 | 1,857,567 | $30,133. |
| Fairbanks: | 80 | 1,470,124 | $41,490. |
| Other: | | | |
| Nenana | 1 | 28,375 | $ 797. |
| Clear | 3 | 78,031 | $ 2,715. |
| Portage | 1 | 38,010 | $ 198. |
| Palmer | 1 | 11,910 | $ 282. |

Source: Authors' computations from printout of intr-line shipments, Station List Tariff, of the Alaska Railroad, United States Department of the Interior.

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